Agriculture

Methane is produced and emitted from the decomposition of livestock manure and the organic components in agro-industrial wastewater.[9] These wastes are typically stored or treated in waste management systems that promote anaerobic conditions (e.g., liquid or slurry in lagoons, ponds, tanks, or pits) and produce biogas, a mixture of about 70 percent methane, 30 percent CO_2, and less than 1 percent hydrogen sulfide.

GMI helps brings together the collective resources and expertise of the international community to address technical and policy issues and to facilitate anaerobic digestion (AD) projects in Partner Countries. GMI also provides a forum to reduce AD project development barriers that commonly exist by raising awareness about AD technologies, building capacity, developing strategies and markets, assisting with project financing, and working directly with Partners to address specific technical and financial concerns.

Through GMI, the United States advances the recovery and use of methane at agricultural operations in several countries, including China, the Philippines, and Thailand. U.S.-supported workshops and demonstration projects are instrumental in ensuring successful development of commercially operating AD projects. Many of these activities, which provide multiple benefits, such as water pollution control and improved rural sanitation, will continue to yield methane emission reductions in future years.

Working With Small- to Medium-Scale AD Systems in the Philippines

In the Philippines, the agriculture sector contributes 71 percent of the country's methane emissions, of which livestock manure accounts for approximately 10 percent.[10] Because many of the emissions are from small farms, EPA has focused on supporting small-scale AD technology development, including fixed domes, stacked domes, and tubular and bag digesters.

In 2011, the Philippine Council for Industry and Energy Research and Development hosted a series of training workshops supported by a joint initiative between EPA and the World Bank. These trainings were intended to develop a cadre of in-country technical experts who learn to design AD systems, manage system construction, and train AD operators in the operation, maintenance, and troubleshooting of these systems. The workshops covered a range of topics, including digester design (i.e., estimates of standing pig population,

Tubular digester in the Philippines

[9] Agricultural methane sources also include rice cultivation and enteric fermentation. GMI's Agriculture Subcommittee focuses on livestock and agro-industrial wastes.

[10] U.S. EPA, 2012.

process water use, potential energy reduction calculations); digester financing and performance (e.g., quantification of certified emission reductions); hands-on digester design, construction, and operation; flare installation; gas handling; and methane measurement, verification, and reporting.

As part of these trainings, EPA developed pilot-scale tubular digesters with larger diameter material (appropriate for up to medium-scale farms) that reduce costs by 50 percent when compared to other designs.

In 2011, EPA developed a simple Excel-based calculator tool to assist in designing covered lagoon systems for swine waste management in the Philippines. Using the tool is straightforward; it has a simple interface through which users enter farm-specific data. The tool estimates design parameters, emission reductions, energy generation potential, and costs for swine-related covered lagoon systems. Similar tools for other countries may be developed in the future for use in digester design-related trainings. EPA also supported the development of technical standards for small-scale AD systems to enable Philippine farmers to design and operate these systems.

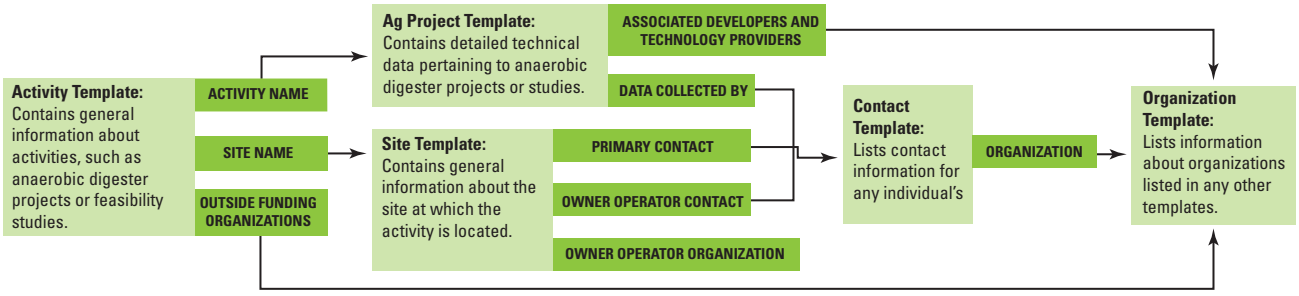
Developing the International AD Database

The United States contributed to the development of an international AD database that provides information on the types and scale of operating AD systems in GMI Partner Countries. This information can help identify the types of projects that are successful in certain countries or regions. In 2011, EPA began collecting data from Partner Countries using a standardized data collection template (see Figure 7). Currently, the database contains information on more than 450 AD systems in China, Mexico, the Philippines, Thailand, and Vietnam (Table 2). These projects involve more than 3.5 million swine and almost 100,000 dairy cows. EPA expects the number of commercially operating AD projects to increase as it continues to develop programmatic environments by which projects can be deployed using local design and service industries around the world.

Table 2. Commercially Operating AD Projects in the International AD Database

Country	Number of Projects
China	15
Mexico	395
Philippines	6
Thailand	33
Vietnam	14

Figure 7. International AD Database Data Collection Template



Conducting Resource Assessments

EPA continues to support a strategic approach to reducing methane from the agriculture sector by assisting with the development of country-specific resource assessments (RAs). These assessments are critical planning tools that identify and rank the agriculture sectors and subsectors for potential emission reductions. In 2011, EPA finalized RAs for the Dominican Republic and Turkey. Based on the RAs EPA has conducted to date, more than 55 $MMTCO_2E$ could be reduced by implementing AD systems for agricultural waste in those Partner Countries (see Table 3).

Table 3. Potential Emission Reductions Identified in Resource Assessments

Country	Potential Emission Reductions ($MTCO_2E/y$)
Argentina	2,274,700
Brazil	20,313,300
Colombia	1,241,700
Dominican Republic	354,800
Ecuador	386,500
India	5,716,100
Mexico	14,785,600
Philippines	2,553,800
Thailand	4,956,000
Turkey	1,328,100
Vietnam	1,420,300
Total	**55,330,900**

Leveraging Funds and Partnerships

Since 2006, the United States has entered into partnerships with GMI Partner Countries, NGOs, farm owner cooperatives, the United Nations (U.N.), and the World Bank. Through funds and technical assistance agreements, these partnerships have successfully increased adoption of AD technology.

The Livestock Waste Management East Asia project, for example, was a partnership between GMI, the World Bank, the U.N. Food and Agriculture Organization (FAO), commercial farmers, and the governments of participating countries (China, Thailand, and Vietnam). The program promoted institutional capacity-building and policy development and implementation to create affordable pollution control methods for livestock waste management in order to reduce major negative environmental and health effects associated with concentrated livestock production. The project began in 2006 and was completed in December 2011. Over the course of the project, the World Bank provided $21 million in funding, with partner governments and farm owners contributing additional funds. EPA and FAO provided technical assistance and additional funding to help implement projects and increase the number of participating farms.

Coal Mines

Methane is emitted from active and abandoned underground and surface mines, and as a result of post-mining activities, including coal processing, storage, and transportation. To facilitate coal mine methane (CMM) project development, GMI is building international alliances to advance methane recovery and use at coal mines throughout the world.

Underground mines are the single largest source of CMM emissions in many coal-producing countries. For years, methane in coal mines was viewed as a nuisance and a safety hazard that had little intrinsic value. Current CMM recovery and use projects have shown the opposite is true: CMM is a clean energy source and a commodity that, when captured, can provide many benefits to the mine in terms of increased revenue, improved worker safety, and greater mine productivity.

The United States is a leader in CMM recovery and continues to work with international partners through GMI to share information, expertise, and technology to promote CMM project development.

Continuing Support for CMM Recovery and Utilization in China

In 2011, EPA continued to support CMM recovery and utilization project feasibility studies at Chinese coal mines. The studies assess the technical and economic viability of implementing methane recovery and utilization projects, with detailed findings and project implementation recommendations compiled in comprehensive final reports.

With EPA funding, the Virginia Center for Coal and Energy Research (VCCER), which is affiliated with Virginia Polytechnic Institute and State University (Virginia Tech), developed a regional handbook for coalbed methane (CBM) degasification in the Southern Shanxi province of China. VCCER and its collaborative research partners conducted a detailed CBM reserve analysis on a gas-bearing coal property in China's Qinshui Coal Basin, considered to be representative of the region.

In November 2011, EPA published a report entitled *China's Energy Markets: Anhui, Chongqing, Henan, and Guizhou Provinces*. This document compiles the results of energy market analysis performed during the course of several comprehensive CMM recovery and utilization feasibility studies conducted in China. In 2011, EPA also completed its feasibility study for CMM drainage and utilization at the Tai Xi Group Mines in Inner Mongolia, China.

Expanding mine gas storage silo in Southern Shanxi, China

Capacity-Building Meetings in India

A collaborative effort between EPA and key Indian organizations to bring India's coal methane resources to market in an environmentally beneficial manner has produced a first for India: prospective operators are being offered active coal mining blocks to develop projects to extract and utilize CMM. In early 2011, India's Central Mine Planning and Design Institute (CMPDI) issued a notice inviting tenders for five CMM blocks held by Coal India Limited (CIL).

As part of this activity, EPA met with Indian organizations focused on coal mining and methane emission reductions. During the trip, EPA toured new laboratory facilities and methane data collection field sites on the coal blocks that have been designated by the Indian government for potential CMM development.

In October 2011, EPA co-hosted the first Indo-U.S. workshop on CMM with the Central Institute of Mining and Fuel Research (CIMFR) in Dhanbad. The goal of the four-day workshop was to share information on coal seam gas and drainage and utilization technologies with local mining officials. Presentation topics included financial feasibility of CBM/CMM projects, mine degasification systems, directional drilling, well logging, and sustainability. The workshop also included a site visit to the Parbatpur CBM development project.

Drilling cores in the Damodar Valley, India

Disseminating Best Practices and Assessing Opportunities in Kazakhstan

In 2011, the United States continued to support dissemination of a new document that GMI was integral in developing—*Best Practice Guidance for Effective Methane Drainage and Use in Coal Mines*—published by the United Nations Economic Commission for Europe (UNECE) in 2010. This publication directly contributes to improving mine safety standards at active underground coal mines by supporting safer mining practices to reduce fatalities, injuries, and property losses.

In May 2011, EPA supported a UNECE Best Practices Workshop in Karaganda. The workshop featured international experts presenting on best practices for pre-mine drainage, post-mining drainage drilling methods, methane utilization and abatement, and the current status of gas drainage and utilization at Arecelor Mittal Lenina Mine in Temirtau.

EPA conducted a mission to Kazakhstan to learn more about the current status of the country's coal industry and discuss areas for potential CMM project opportunities. Subsequently, EPA published *Deep Gassy Coal Mines of Karaganda Coal Basin*, which features detailed information on the Karaganda Coal Basin. The report highlights current CMM capture and utilization opportunities for four Arcelor Mittal Temirtau underground coal mines—Kazakhstanskaya, Lenina, Abaiskaya, and Tentekskaya—and seeks to identify potential opportunities for future site-specific assessments.

Supporting a Cogeneration Project in Poland

In 2011, an EPA-funded feasibility study found that methane from the abandoned Zory Coal Mine in Poland could be economically extracted and converted to liquefied natural gas (LNG). The report estimated that CMM captured from the abandoned Zory Coal Mine could help avoid 490,000 billion cubic meters (m^3) in methane emissions annually. Based on the study's finding that the project could be even more economical, a 2-megawatt (MW) combined heat and power (CHP) plant generation unit has been in operation at the mine since 2010. The engine is fueled with gas from the mine, power is sold to a power supply corporation power trader, and the thermal energy is sold to a heat supplier for a small housing estate. The system produces about 46,500 kilowatt-hours of energy per day, which is enough to power more than 11,000 households, and the thermal energy serves almost 1,800 apartments.

CHP unit at abandoned Zory Coal Mine in Poland

Continuing Technical Discussions in Ukraine

In September 2011, EPA hosted a technical workshop in conjunction with a UNECE Best Practices Workshop in Donetsk. The two-day GMI event was attended by nearly 100 participants and brought together key CMM recovery and utilization experts to share information about the state of Ukraine's coal industry, best practices for degasification in advance of mining, maximizing methane capture and optimizing gas utilization, and mitigating ventilation air methane (VAM) emissions. The workshop focused on mine safety, covering topics such as current programs for training new coal mine inspectors, explosion prevention, post-mining drainage, and advanced drilling technology in overpressured formations.

Additional Coal Workshops, Scoping Missions, and Tools

EPA participated in CMM workshops in Colombia, Russia, and Turkey, and conducted a scoping mission to Vietnam to discuss CMM/CBM project development at four coal mines in Mao Khe, Quang Hanh, Duong Huy, and Khe Cham. To aid CMM project developers, EPA updated an existing CMM technology database that provides basic descriptions of key CMM recovery and utilization technologies, including each technology's current status and commercial availability.

EPA also published a white paper discussing CMM projects that involve flaring-only of drained gas. Based on information about more than 300 projects in the GMI CMM Project Database, EPA identified 10 flaring-only projects and an additional 13 energy recovery projects that flare nonrecoverable gas. The paper compares the GHG emission benefits of flaring to both energy recovery and venting to the atmosphere. Based on the findings, the GMI Coal Mines Subcommittee adopted the position that flaring should only be considered for mines with low-concentration drained CMM, where installing CMM end-use projects might be technically or economically infeasible or impractical.

Municipal Solid Waste

Municipal solid waste (MSW) management and treatment activities are sources of methane emissions worldwide. Opportunities exist for reducing methane emissions by collecting the methane-containing landfill gas (LFG) from landfills and using it for fuel. Methane emissions from MSW can also be reduced by modifying how the collected waste is treated. Organic fractions of the MSW stream can be diverted from landfills and instead disposed of at anaerobic digesters, composting facilities, or waste-to-energy facilities. Using these climate-friendly MSW solutions can yield substantial energy, economic, environmental, and public health benefits.

GMI brings together collective Partner resources and experience to facilitate technology transfer and demonstration, policy support, capacity-building, and market development necessary to implement LFG energy projects and increase LFG emission reductions. Specifically, the MSW sector has been working to reduce the barriers to LFG energy project development in Partner Countries. These barriers include the following: lack of in-country technical expertise; inadequate identification or evaluation of suitable candidate landfills; lack of demonstrated technical and economic feasibility of proven technologies and practices in local contexts; and other financial, informational, and institutional obstacles.

Engaging and Training Local Government Officials

Argentina

EPA provided a series of informational presentations to the Bahia Blanca City Council on the basics of LFG energy and the climatic and economic benefits and opportunities of LFG recovery projects. The presentations included an overview of LFG energy recovery technologies and the fundamentals of LFG formation, collection, and control. EPA also made presentations to the municipal sustainability coordinator and the Argentina Solid Waste Association.

China

EPA was invited by JUCCCE, a nonprofit organization dedicated to accelerating the greening of China, to participate in a 10-day training event in Beijing sponsored by the National Academy for Mayors of China. The GMI training session was attended by 36 mayors, focused on LFG capture and utilization, and included a site visit to the Gaoantun Landfill, which has received significant EPA technical assistance on the design and operation of its LFG collection and monitoring system.

LFG-fired boiler in operation at Gaoantun Landfill in China

Continued Partnership with the International Solid Waste Association

EPA and the International Solid Waste Association (ISWA) have been collaborating on environmental protection and integrated solid waste management by co-hosting workshops and trainings and working together informally on other technical assistance activities. In 2011, EPA and ISWA continued this partnership and took a major step toward formalizing this highly successful relationship.

GMI participated in an ISWA- and SIBICO International Ltd.-organized solid waste conference held in Moscow, Russia. EPA contributed by sponsoring a session on its experience in landfill biogas extraction and utilization technology application, and by conducting a LFG energy workshop. ISWA formally joined GMI by signing a memorandum of understanding (MOU) with EPA—a major conference highlight. Under this MOU, EPA and ISWA pledged to collaborate on a number of activities, including: coordinate training activities and workshops; promote GHG reduction and mitigation and energy recovery from the waste sector; build LFG capture and utilization capacity in ISWA-GMI countries; and provide critical support, feedback, and review for tools, reports, and guidance.

Following up on the MOU commitment, EPA participated in ISWA's 2011 Beacon Conference in Novi Sad, Serbia, which focused on waste-to-energy technologies and opportunities and packaging waste in developing countries. EPA presented a paper delineating market conditions in central and eastern Europe and identifying ways GMI might support growing LFG energy opportunities in those regions.

Educating Stakeholders on the Benefits of Direct Thermal LFG Energy Projects

Electricity-generating projects are the most prominent LFG energy projects worldwide. To encourage the development of international projects that directly utilize LFG, EPA sponsored a variety of initiatives—including study tours and feasibility studies—to educate corporations on how LFG can be a reliable and low-cost fuel source for their operations.

In September 2011, LFG energy professionals from Mexico and Serbia traveled to several LFG energy projects located in Georgia, North Carolina, and South Carolina to participate in a study tour. The tour included visits to a wide variety of industrial and commercial sectors, including auto manufacturers, chemical plants, greenhouses, and artisan kilns. The study tours gave the potential international end users confidence that the technology is demonstrated, reliable, and cost-competitive with other alternative fuel sources.

EPA conducted searches for landfills in close proximity to manufacturing facilities. In 2011, EPA worked closely with ALFA, CEMEX, Kimberly-Clark Corporation, and Proctor and Gamble to map coordinates of various plants in GMI Partner Countries—such as Brazil, China, the Dominican Republic, Germany, Mexico, Poland, and the United States—with landfills from the GMI International Landfill Database. EPA worked with landfill operators to confirm technical data and then applied country-specific LFG modeling tools to assess the site-specific potential for a LFG energy recovery project.

Site tour participants visit the flare station at EnergyXchange in North Carolina

Expanding Work in New GMI Partner Countries

Ethiopia and Nigeria

EPA participated in a GMI-sponsored side event at the African Carbon Forum, which is a knowledge-exchanging platform for all carbon markets. The workshop featured speakers from EPA, Ethiopia, and Nigeria who discussed advancing landfill methane projects and the associated public health benefits achieved through the advancement of improved solid waste practices. EPA presented an overview on GMI and its work in Africa to date. Other presentations focused on opportunities for reducing landfill methane emissions and improving solid waste management in Ethiopia, as well as incorporating LFG recovery as a component of integrated solid waste management in the Lagos State of Nigeria.

EPA awarded a grant to Nigeria's Lagos Waste Management Authority (LAWMA) to evaluate capturing and utilizing LFG from the Abule Egba and Solous Landfills. Based on the findings, LAWMA commenced the first phase of its LFG energy project, which will ensure steady electricity supply to residents in 2012. EPA also sponsored a grant with Ethiopia's Community Development Research to host a Landfill and Solid Waste Management Workshop in Addis Ababa. Session topics included assessment of Ethiopia's landfill operations, current solid waste management practices, LFG collection processes, and market conditions and technologies available for LFG energy.

Turkey

EPA representatives traveled to Turkey for a six-day scoping visit to observe landfill operations and site conditions and discuss LFG energy market conditions with local stakeholders. The tour included visits to the Kemerburgaz Odayeri, Komucouda, and Kocaeli Landfills—two of which included LFG energy projects. Visits were also made to composting and recycling facilities and a gasification plant in Kermerburgaz, as well as a hazardous waste incinerator in Kocaeli.

Bringing New LFG Projects Online

In 2011, EPA provided technical assistance to several new LFG collection and beneficial energy-use projects. In Brazil, the Solid Waste Treatment Center BR-040 in Belo Horizonte added a fourth GE Jenbacher engine and installed 5.6 MW of electric-generating capacity, and is sending this renewable energy to the local grid. In Colombia, a LFG flare with a rated capacity of 3,000 m^3 per hour was installed at the El Guacal Sanitary Landfill in Heliconia. Together, these new projects accounted for total GHG reductions of 256,848 $MMTCO_2E$ in 2011. Both projects have been registered and have submitted monitoring reports to the United Nations Framework Convention on Climate Change's (UNFCCC's) Clean Development Mechanism.

Completing LFG Assessment Reports

EPA completed assessment reports at eight landfills in multiple GMI Partner Countries during 2011 (see Table 4). The objective of these assessment reports was to evaluate the methane emission reduction potential and explore various energy recovery technology options available at the study sites. Collectively, these landfills represent an estimated 454,500 MMTCO$_2$E in potential emission reductions for 2012 if projects were developed at these sites.

Table 4. 2011 LFG Assessment Reports

Country	Name of Landfill/Location
Brazil	Maracanau Landfill (State of Ceara) Uberaba Landfill and Vale de Aco Landfill (State of Minas Gerais)
China	Hongshantou Landfill (Xiangfan) Lingshan Landfill (Jimo) Taoshugang Landfill (Changde) Zhanjing City MSW Landfill (Zhanjing)
Nicaragua	La Chureca Landfill (Managua)

Municipal Wastewater

Methane is produced when the organic material in municipal wastewater decomposes anaerobically. Varying amounts of methane are emitted during the collection, handling, and treatment of wastewater depending on methods employed. A number of techniques can be employed to reduce or recover and use wastewater methane that can yield substantial energy, economic, environmental, air quality, and public health benefits.

Forming New Subcommittee and Taking a Leadership Role

In October 2011, GMI officially added the Municipal Wastewater Subcommittee as its fifth sector subcommittee. Previously, EPA played an active role in the Wastewater Task Force, and volunteered to serve as a co-chair of the newly formed subcommittee.

As a co-chair of the new GMI Municipal Wastewater Subcommittee, EPA is actively engaged in supporting the subcommittee's initial activities:

- **Developing sector action plan.** The sector action plan will lay out the specific activities and strategies that the Municipal Wastewater Subcommittee will undertake to promote methane reduction and use. Once the sector action plan is developed, EPA will formulate a U.S.-specific Wastewater Action Plan.
- **Developing sector fact sheet.** The sector fact sheet will summarize the focus and scope of the new municipal wastewater sector as well as describe the activities that the subcommittee envisions undertaking.
- **Planning and coordinating subcommittee events.** EPA is actively involved in planning and coordinating 2012 Municipal Wastewater Subcommittee events.

Participating in Wastewater Events

Brazil

At the invitation of the Brazilian Association of Sanitary and Environmental Engineering, Rio de Janeiro Chapter, EPA presented on "Opportunities to Use Biogas, Heat & Energy at Sewage Treatment Plants" in June 2011. This presentation focused on studies analyzing the opportunities to utilize biogas, heat, and energy at sewage treatment plants in the United States and included a discussion of potential applications internationally. More than 200 participants from across Brazil and Latin American were in attendance. Other topics covered during the seminar included energy management, energy efficiency, and improved water management.

Chile

In October 2011, EPA presented on biogas recovery opportunities within the wastewater sector at a seminar sponsored by the Biotechnology Nucleus Curauma of the Catholic University of Valparaiso and the Autonomous University of Mexico. EPA was invited to participate in this seminar, both to present on biogas utilization opportunities as well as to gain insights into existing Latin American initiatives focused on GHG mitigation from this sector.

The Netherlands

At the Sixth International Symposium on Non-CO_2 Greenhouse Gases, EPA led a panel discussion addressing global opportunities to reduce methane emissions from wastewater treatment plants. The panel included an overview of GMI's focus within the sector and was followed by private sector presentations focused on anaerobic digesters, as well as overviews of methane capture and use opportunities in Brazil and across Latin America.

Oil and Gas Systems

Methane emissions occur during normal operation, routine maintenance, and system disruptions in the oil and natural gas industry. Emissions vary among facilities and are largely a function of process and equipment type, operation and maintenance procedures, and equipment conditions. Although natural gas is a relatively clean source of energy, methane losses from oil and gas systems account for more than 20 percent of total worldwide methane emissions.

GMI's Oil and Gas sector has undertaken numerous activities to support the identification, reduction, and recovery of vented and fugitive methane emissions from oil and natural gas systems in Partner Countries. Through capacity-building workshops and trainings, prefeasibility and onsite measurement studies, and the development of critical tools and resources, the sector works to reduce the informational, institutional, and financial barriers to emission reduction technologies and practices.

The United States encourages GMI Partner Countries to implement proven, cost-effective technologies and practices that can minimize methane losses.

Conducting Measurement Studies With Gas Authority of India Limited

The Gas Authority of India Limited (GAIL) is a state-owned natural gas processing and distribution company with headquarters in New Delhi. GAIL, which was incorporated in August 1984, was initially given the responsibility of constructing, operating, and maintaining a large pipeline project that served as a cornerstone for India's natural gas market. GAIL has since grown by building core pipeline assets, processing plants, and a gas-based petrochemical business. GAIL joined the Natural Gas STAR International Program in August 2011, and has been working collaboratively with EPA as well as Natural Gas STAR International partner Oil and Natural Gas Corporation (ONGC).

EPA conducted a two-week measurement study at GAIL's Vijaipur facility. This field work builds on the desktop study of GAIL's Vijaipur facility, which was completed in May 2011. The measurement study not only sought to establish the actual emission estimate, but also showcased the advantages of conducting leak inspections using the forward-looking infrared (FLIR) camera. As part of the study, leaks were measured using a Hi-Flow Sampler, a turbine meter, or an acoustic leak detection device. A significant study outcome involved making actual measurements for the seal oil degassing vents using a turbine meter.

Leak measurement using a Hi Flow® Sampler at GAIL's Vijaipur facility

Undertaking Field Measurement Studies and Training Workshops in Mexico

Global Gas Flaring Reduction Workshop

In May 2011, the World Bank's Global Gas Flaring Reduction (GGFR) Partnership and EPA organized a joint workshop addressing flaring, venting, and fugitive emissions in PEMEX installations. The specific workshop objective was to build capabilities in support of PEMEX's Strategic Flare/Vent/Fugitives Measurement Plan within the newly formed Grupos de Medición. GGFR and GMI experts provided a detailed overview of current best practices on measuring gas flare, vent, and fugitive volumes; outlined key constraints and considerations when selecting flare measurement systems for both new and existing flaring installations; discussed practical metering experiences and challenges faced by operators; and provided other lessons learned from their experience in monitoring, verification, and regulatory supervision. The workshop targeted staff from PEMEX as well as Mexico's Energy Secretariat and National Hydrocarbon Commission. EPA presentations provided overviews of GMI, the Natural Gas STAR Program, and EPA's GHG Reporting Program, as well as results of the training and measurement study work with PEMEX.

Measurement Study and Training

In late 2011, GMI, GGFR, and PEMEX collaborated to organize a four-day methane emission measurement study combined with a one-day training session for 35 people from PEMEX Exploration and Production in Poza Rica. The classroom training session provided a broad overview of the technologies for methane emissions detection, quantification, and control. It also covered more strategic topics associated with planning, execution, implementation, and follow-up of measurement studies. Over four days, the trainees participated in a measurement study of five installations, with training on equipment use, measurement study activities, and information recording for a variety of methane emissions sources. In addition to methane venting and leak measurements, the study also included GGFR Partnership-supported measurement and analysis of soot formation in flare burners.

Touring Facilities in Texas and New Mexico

Representatives of ONGC (India), Gazprom (Russia), and ENAP Sipetrol (Argentina) joined their U.S. Partner companies to tour operational facilities and exchange ideas for accelerating implementation of projects that capture and use methane. Three U.S. Natural Gas STAR partners—Chevron, Oxy, and ConocoPhillips—hosted the first-of-its-kind study tour, which covered facilities over an expanse of more than 1,100 miles in a 10-day period.

The West Texas and New Mexico sites showcased specific methane emission reduction projects, including vapor recovery units (VRUs), plunger lifts, and reduced emission completions. Participants discussed these projects with the hosts and collected information to help them evaluate project applicability at their own facilities.

Study tour highlights included discussing the causes of reciprocating rod packing emissions and potential solutions, studying techniques for using infrared cameras, visiting manufacturing facilities to view various types of VRUs and emission inspection/quantification tools, and exploring methane emission capture and control methods with equipment experts. During the tour, ONGC's carbon management team also presented on its GMI activities and emission reduction projects, including tank VRU rehabilitation, servo gas system replacement with instrument air, and vapor recovery using an ejector system.

Study tour participants and a ConocoPhillips representative near a well completion site

Oil and Gas Workshops Around the World

Colombia

EPA hosted a technical training workshop in August 2011, teaming with the Centro de Tecnología de Gas de Colombia, a research organization that provides technical assistance to Colombian natural gas transmission and distribution companies. The training focused on the major sources of methane emissions from gas transmission and distribution, as well as the tools and techniques needed to carry out a methane emissions measurement study.

Indonesia

EPA's Natural Gas STAR International Program attended the Society of Petroleum Engineers' 2011 Asia Pacific Oil & Gas Conference and Exhibition in Jakarta. The event focused on business and technology innovation to ensure sustainable energy. Immediately following the conference, EPA held its first-ever GMI Asia-Pacific Technical Workshop for the Oil and Gas Sector, which was attended by industry executives and other interested parties, with a main goal of sharing GMI and Natural Gas STAR Partner experiences and exchanging technical information on minimizing methane losses.

EPA also participated in the 2011 Pacific Energy Summit, again held in Jakarta, which brought together more than 100 participants from government sectors and oil and natural gas companies. The summit allowed EPA representatives to participate in the dialogue surrounding the environmental considerations important to the development and use of natural gas in Southeast Asia and the southern Pacific. The summit focused on several issues related to natural gas development and use in the region, including: natural gas as an energy source for transitioning to a low-carbon economy; growing role of natural gas to meet rising energy demand; fiscal, regulatory, and legal steps to ensure adequate natural gas supplies; and current and projected domestic natural gas markets.

Russia

EPA supported and participated in an Environmental Defense Fund workshop on methane emissions control in the Russian gas sector, held in Moscow in December 2011. Attendees represented a diverse group of stakeholders, including UNFCCC Joint Implementation project developers with investment portfolios concentrated on the gas industry. The presentations were informative and prompted lively discussion on a variety of topics, including: climate policy and the role of the natural gas sector both in Russia and globally, international climate negotiations, and technological solutions to methane emission control in the natural gas industry.

Ukraine

More than 45 transmission and distribution sector representatives attended a two-day workshop led by EPA and Pacific Northwest National Laboratory in June 2011. The workshop, which took place in Cherkassy, brought together participants from laboratories in all of Ukraine's natural gas transmission and distribution systems. The goal of the workshop was to share best practices and build capacity for methane detection, monitoring, and measurement technologies and practices. This was the first in a series of trainings for staff members who are responsible for leak detection and measurement activities at Ukrtransgaz.